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AN ANNOTATED LIST OF SHELLS FROM
NORTHERN MICHIGAN.

BY MINA L. WINSLOW.

The shells listed below were collected by members of four expeditions from the Museum of Zoology and the Michigan Geological and Biological Survey. In 1912 Mr. N. A. Wood made a small collection at Whitefish Point, Chippewa County, while engaged primarily in work on birds and mammals, also a larger collection in the same region in 1914; a third incidental collection was made by him in Alger County during the summer of 1916. In 1915 a more extensive collection was made near Floodwood in Schoolcraft County by persons able to devote more time to the work, with the result that 41 of the 65 species and varieties listed were secured in that region.

The species discovered are those that might have been expected in the region, judging by the results of other collectors to which reference is made in the short bibliography at the end of this paper (Walker, 1894, 1906, 1908, 1915).

The writer is indebted for generous assistance in the determination of species, exclusive of the Sphæriidæ, to Dr. Bryant Walker, of Detroit, and in the determination of the Sphæriidæ to Dr. Victor Sterki, of New Philadelphia, Ohio.

By way of a systematic summary it may be noted that the species fall into the following groups:

<i>Terrestrial</i> , 19 species and varieties:		<i>Fluviatile</i> , 46 species and varieties ¹ :	
Family.	Genus. Species.	Family.	Genus. Species.
Helicidæ	1 2	Lymnaeidæ	3 6
Zonitidæ	3 6	Physidæ	1 8
Limacidæ	2 2	Planorbidæ	1 10
Philomycidæ	1 1	Ancylidæ	1 1
Endodontidæ	2 4	Viviparidæ	1 2
Succineidæ	1 2	Amnicolidæ	1 1
Pupillidæ	1 1	Unionidæ	4 6
Cochlicopidæ	1 1	Sphæriidæ	3 12
	— —		— —
	12 19		15 46

LIST OF SPECIES.²

I. *Polygyra albolabris* (Say).—Schoolcraft: Several specimens were found on rotten wood and leaves along the Manistique River and in the hardwood forest. They are rather frail shells, with the exception of No. 33 which is quite solid and of a pale yellow color. Alger: From the hardwood forest. Of the eleven specimens three are immature. Chippewa: Found in the road after a rain. Others from hardwood forest and spruce-cedar swamp near Vermilion. Eggs and young shells were collected near Vermilion. The smallest measure alt. 2; diam. 3.25 mm.; the largest, thirty-two days old,

¹ Two species not represented in these collections (*Physa heterostropha* Say and *Sphaerium simile* Say) have been listed from Chippewa County (Hankinson, pp. 118, 132, 133, 134, 135).

² In the list of species the localities referred to are counties unless otherwise stated.

measure 2.75 x 5 mm. This would seem to show the rate of growth.

The series of this species (Chippewa County, 11; Alger County, 8; Schoolcraft County, 2) is too small to give much idea as to what is really the prevailing type of this region, especially as the series is extremely variable. Thus the two specimens from Schoolcraft County measure:

Alt. 16.75 mm.;	Diam. 26.75 mm.;	Axial Index 63.
19.00	27.50	69.

The first is a good representative of the flat northern form, while the latter is quite typical of the southern race.

The eight specimens from Alger County vary from 25.5 mm. to 29.75 mm. in diameter, six of them being between 27 mm. and 27.75 mm. in diameter; the altitude varies from 17 mm. to 18.75 mm. and the axial index from 64 to 69.

The eleven specimens from Chippewa County vary from 25.5 mm. to 29.5 mm. in diameter, and from 16 mm. to 19.5 mm. in altitude, and the axial index from 63 to 70 mm., and they exhibit the same tendency toward the northern form on the one hand and the southern form on the other.

The average dimensions of the three sets are as follows:

Alger Co.,	Alt. 17.88 mm.,	Diam. 27.34 mm.,	Axial Index 67
Chippewa Co.	18.36	27.02	68
Schoolcraft Co.	17.88	27.13	66

A comparison of the average shell of the whole series with the average shell from the Upper and Lower Peninsula (Walker, 1900, p. 36) and from the Charity Islands (Walker, 1915, p. 2) may be made as follows:

Up. Pen.	Alt. 17.02 mm.,	Diam. 25.81 mm.,	Axial Index 65
Chippewa, Alger,			
Schoolcraft Co.	18.03	27.16	67
Charity Ids.	18.51	26.33	70
Lower Pen.	18.10	27.10	68

So far as this shows anything, it would seem that the average shell in this series is both larger and higher than the average Upper Peninsula specimen; that it is wider and more depressed than the average Charity Island shell, and also a trifle wider and more depressed than the average Lower Peninsula specimen. It must be said that the chief impression made by an inspection of the whole series was that of its extreme variability, giving the appearance of coming from a transition region. This, however, may be the result of variation in local conditions of environment rather than of geographical situation.

2. *Polygyra fraterna* (Say).—Schoolcraft: From decaying wood on high ground. Alger: From decaying maple log. Chippewa: From spruce-cedar swamp and hardwood forest near Vermilion.

All the specimens are umbilicate, and the occurrence of this species with the preceding one again bears out the conclusions of Dr. Walker in regard to their coincident distribution (Walker, 1905, pp. 92-93, Pl. I).

3. *Vitrea hammonis* (Ström).—Schoolcraft: Found under logs, on dead leaves in a pond, and under log on a wooded sand ridge.

4. *Vitrea binneyana* (Mse.).—Schoolcraft: One lot of this species from rotten wood and leaves in the hardwood forest. It has been listed as a boreal species (Walker, 1908, p. 282).

5. *Vitrea ferrea* (Mse.).—Schoolcraft: Three specimens were collected in the hardwood forest among leaves and decaying wood.

6. *Euconulus chersimus polygyratus* Pils.—Schoolcraft: Under logs. Alger: In old dead logs.

7. *Zonitoides arborea* (Say).—Schoolcraft: Eight lots of this common species were collected on logs, on sand ridges, in

hardwood forest, and from sand in Bear Creek. Alger: Found on old logs of maple, birch, and hemlock, and on an old mushroom. Chippewa: Found under logs and in a cedar-spruce swamp near Vermilion.

8. *Zonitoides exigua* (Stimp.).—Schoolcraft: A single specimen from leaves at the bottom of a wooded pond. This is one of the “purely boreal species, which are characteristic of the northern region and whose range to the south is as a rule quite restricted.” (Walker, 1908, p. 282.)

9. *Agriolimax agrestis* (L.).—Chippewa: A single slug of this species was found under a wet log.

10. *Agriolimax campestris* (Say).—Schoolcraft: Under rotten wood and leaves in the hardwood forest on both high and low ground.

11. *Pallifera dorsalis* (Binn.).—Schoolcraft: Found with *A. campestris*. Chippewa: From the same location as *A. agrestis*.

12. *Pyramidula alternata* (Say).—Schoolcraft: Specimens from six habitats were collected in decaying logs and leaves. The largest is sub-scalariform. Alger: Five lots, mostly immature shells, were obtained in the hardwood forest, and in the Whitefish River. One shell has the following dimensions: alt. 17 mm., diam. 20.5 mm., axial index 82.10. Chippewa: Specimens from an old log pile were juveniles; one from a spruce-cedar swamp near Vermilion is rather high, measuring 12.5 mm. x 18 mm.; others were collected in the hardwood forest, Vermilion.

13. *Pyramidula cronkhitei anthonyi* (Pils.).—Chippewa: From a spruce-cedar swamp near Vermilion.

14. *Pyramidula cronkhitei catskillensis* Pils.—Schoolcraft: From high and low ground, under logs, decayed wood,

and leaves. Chippewa: From old logs and from a dry pond in spruce and birch woods. The largest shell is very close to *anthonyi* and ought perhaps to be called that.

The predominance of this form over the preceding one accords with the observations of Walker (Walker, 1908, p. 287) who states that *anthonyi* is "apparently replaced throughout the Upper Peninsula by the var. *catskillensis* Pils."

15. *Helicodiscus parallelus* (Say).—Schoolcraft: This common form was found in decaying wood and leaves in the hardwood forest. Alger: Found in old dead logs.

16. *Succinea retusa* Lea.—Alger: Three lots of immature shells from Whitefish River have been referred to this species. The largest measures 10 mm. in altitude and 6.75 mm. in aperture length.

17. *Succinea ovalis* (Say).—Chippewa: Very young specimens from Shelldrake River near Vermilion.

18. *Strobilops virgo* (Pils.).—Schoolcraft: From leaves in a pond. "A characteristic boreal species * * * apparently rarely found south of the Saginaw-Grand valley." (Walker, 1908, p. 282.)

19. *Cochlicopa lubrica* (Müll.).—Schoolcraft: Three individuals were found on logs on both high and low ground.

20. *Lymnæa humilis modicella* (Say).—Schoolcraft: One small shell, not fully mature, was found in a wooded swamp.

21. *Lymnæa obrussa peninsulæ* Walker.—Schoolcraft: One lot of twenty specimens was taken from submerged logs and sand in Buschwahr Creek. All the specimens are immature, several are somewhat malleated, and almost all have their apices eroded.

22. *Lymnæa obrussa exigua* Lea.—Chippewa: Found in a pond on the beach at Vermilion.

23. *Lymnaea elodes* Say.—Chippewa: A young shell, but apparently this species, of 2.5 whorls, 2.75 mm. x 1.15 mm. The lip is thickened and the columella is heavily calloused.

24. *Lymnaea lanceata* Gld.—Schoolcraft: From a slough, in leaves and weeds. These are typical in form and size, and are eroded on the apices.

25. *Lymnaea emarginata* Say.—Young shells from rocks at the edge of the water, Mackinac Island. Abundant in this locality (Walker, 1908, p. 290) and a representative of the purely boreal element (*Ibid.*, p. 282).

26. *Physa gyrina* Say.—Schoolcraft: From submerged leaves and grass in a wooded pool with sand bottom, in a backwater from the river, from Buschwahr Creek, and from Bear Creek. Almost all of the lots are immature shells. Alger: One lot, from rushes in White Lake. Chippewa: From black ash swamp, Vermilion; from pond on the beach at Vermilion; and a variety with longitudinal stripes from Beaver Pond, Vermilion.

27. *Physa elliptica* Lea.—Chippewa: A very large series of several hundred specimens was obtained from a small spring brook. Almost all are striped with white.

28. *Physa ancillaria crassa* Walker.—Several specimens were collected with *Lymnaea emarginata* Say from rocks at the edge of the water, Mackinac Island.

29. *Physa sayii warreniana* Lea?—Alger: From Whitefish River. Chippewa: Shelldrake River, Vermilion; on lily leaves and stems, Vermilion Lake; shore of Lake Superior near Vermilion; pond on beach, Vermilion.

This is the common form of *Physa* represented in the collection. It has been difficult to refer these shells to any species through the lack of any very distinctive characters. Very few fully mature specimens are in the collection.

30. *Physa integra* Hald. var.—Schoolcraft: Most of the specimens from this county are distinguished from the typical form by the presence within the aperture of a heavy reddish varix, and by the more shouldered and less expanded character of the whorls. They were found on sand and grass in Bear Creek and on sticks in the Manistique River.

31. *Physa aplectoides* Sterki.—Schoolcraft: Several specimens were collected on rotten leaves in a wooded swamp. The first record for this species was made in Ohio by Dr. Sterki; the second (first for Michigan) on Isle Royale by Dr. Walker. This is the second Michigan record and adds a connecting link for the two localities.

32. *Physa* sp.—Schoolcraft, Chippewa. In this division are placed all the shells too young for specific identification.

33. *Aplexa hypnorum* (L.).—Schoolcraft: In a wooded pond, the bed of a brook, and a slough, several specimens were taken.

34. *Planorbis trivolvis* Say.—Schoolcraft: From dead leaves in a pond, and from submerged brush in a glacial lake surrounded by a cranberry marsh. Alger: A good series of specimens was obtained in Whitefish Lake and in Silver Lake. The typical form grades into the following variety.

35. *Planorbis trivolvis binneyi* Tryon.—Alger: From Whitefish Lake. The intergradation of this form with the typical *trivolvis* seems again to bear out the opinion of Dr. Walker that *binneyi* is a variety, and not a distinct species (Baker, p. 277). One specimen agrees in surface malleation with the shell figured by W. G. Binney (p. 115, fig. 193) as *P. corpulentus* and noted as "a curiously indented form from the west coast." The same specimen, which is the largest of the lot, measures as follows: greatest diameter 27.25 mm., lesser

19 mm., altitude of the aperture 15.00 mm., at the aperture 10 mm.

36. *Planorbis antrosus* (Con.).—Schoolcraft: From logs and sand in Buschwahr Creek.

37. *Planorbis antrosus striatus* (Baker).—Schoolcraft: From weeds in Beaver Pond. Chippewa: From pond lily leaves in Beaver Pond, a pond on the beach at Vermilion, and leaves in Vermilion Lake. All of this form in the collection tend to have the rounded whorls of var. *aroostookensis*.

38. *Planorbis hirsutus* Gld.—Chippewa: Four specimens from Beaver Pond, and several from Vermilion Lake at Vermilion.

39. *Planorbis deflectus* Say.—Alger: Immature shells from lily leaves. Chippewa: Vermilion Lake, Vermilion.

40. *Planorbis parvus* Say.—Chippewa: A good series of this small shell was collected from pond lily leaves in Beaver Pond. Some of the immature specimens are apparently more deeply umbilicated than others and may represent another form; but all the mature shells are *parvus* and these are probably also a variation of that species.

41. *Planorbis umbilicatellus* Ckll.?—Chippewa: Black ash swamp, Vermilion. One small somewhat deformed specimen.

42. *Segmentina armigera* (Say).—Schoolcraft: One lot is typical *armigera*, and was collected from rotten leaves in a wooded swamp.

43. *Segmentina armigera* (Say) var.—Schoolcraft: From leaves and sand bottom in wooded pool and from rotten leaves in a wooded swamp. One lot is nearest to *S. crassilabris* Walker in shape, but the lamellae and aperture approach those of *armigera*. None are typical *armigera* in all points.

44. *Ancylus parallelus* C. B. Ads.—Schoolcraft: One small specimen was found in the debris of the hardwood forest, and another lot (of eleven) was collected from sand and grass in Bear Creek. Alger: A single specimen from pond lily leaves. Chippewa: From pond lily leaves in Beaver Pond.

45. *Campeloma decisa* (Say).—Schoolcraft: Four lots were collected from the Manistique River, and two from Bear Creek. The latter are eroded, not only on the apex but on the body whorl as well, to such an extent that holes have been worn through the shell. The shells from the river are not so much eroded, and are coated with a dark reddish deposit. Chippewa: From a pond near the edge of the road.

46. *Campeloma milesii* Lea?—Chippewa: Young specimens from Shelldrake River, Vermilion.

47. *Annicola limosa* (Say).—Schoolcraft: From sand and grass in Bear Creek. Alger: A good series of this small operculate was collected from lily pads.

48. *Lampsilis luteola* (Lam.).—Schoolcraft: From shallow water in a river cut-off, and from sand at the edge of the Manistique River.

49. *Anodonta marginata* Say.—Schoolcraft: From shallow water in a river cut-off, and from sand and muck bottom in Meesic Lake. The latter are pale yellow tinged with green, and the former are very large and of a darker color. The largest measures 133 mm. x 61 mm. x 50 mm. Chippewa: From a pond and from Beaver Pond at Vermilion. These are deeply colored with green and brown, and show the beak sculpture and the rays of the epidermis. Others were taken in Vermilion Lake, and Shelldrake River, near Vermilion. Alger: Three left valves from Howe's Lake, with the note (by Wood): "Found at edge of lake. Opened by muskrats?"

50. *Anodonta grandis gigantea* Lea.—Schoolcraft: A single valve from shallow water in the river cut-off.

51. *Anodonta grandis footiana* Lea.—Alger: One valve from Whitefish Lake with the note (by Wood): "Shells opened by otter on ice in fall of 1915. Seen and gathered by John Hammer." Chippewa: One broken one from Shelldrake River near Vermilion.

52. *Anodontoides ferussacianus buchanaensis* (Lea).—Schoolcraft: One specimen from the same habitat as that of the last named species. Alger: From Whitefish River.

53. *Unio complanatus* "Sol." (Dill.).—Chippewa: Shelldrake River near Vermilion. Alger: Nine specimens from Whitefish River below Camp White, and one valve with the *A. g. footiana* with note as under that species.

54. *Sphaerium sulcatum* (Lam.).—Chippewa: From a Beaver Pond near Vermilion. "Form—peculiar; if found at other places, at least a subspecies, proved also by No. 10, evidently a juvenile of the same." Sterki.

55. *Sphaerium sulcatum planatum* Sterki.—Chippewa: From Shelldrake River, Vermilion. "Somewhat intermediate; near those from Mountain Lake, Marquette Co., but the latter are much smaller and evidently immature." Sterki.

56. *Sphaerium lineatum* Sterki.—Chippewa: From the bed of Vermilion Lake in water three feet deep. "Large fine specimens, much larger than those from Mountain Lake and less angular behind." Sterki.

57. *Sphaerium stamineum* (Conrad).—Chippewa: Shelldrake River, Vermilion.—"A form." Sterki.

58. *Sphaerium vermontanum* Prime.—Schoolcraft: From a sand bar in the Manistique River. "Not full grown." Sterki.

According to Sterki (Sterki, p. 435) the habitat of this species is "Lakes Champlain and Nephremagog, Vermont.

* * * Specimens which may belong to *S. vermontanum* have been seen from Maine, Quebec, and Ontario."

59. *Sphaerium rhomboideum* (Say).—Chippewa: One specimen, from a Beaver Pond near Vermilion.

60. *Sphaerium occidentale* Prime.—Schoolcraft: Several specimens from a wooded pond, and from leaves in a swamp. Chippewa: Black ash swamp, Vermilion.

61. *Musculium truncatum* (Lins.).—Schoolcraft: Abundant on the sand bottom and on leaves and grass in a wooded pool.

62. *Pisidium variabile* Prime.—Schoolcraft: A few valves from logs and sand in Buschwahr Creek.

63. *Pisidium neglectum* Sterki.—Schoolcraft: From sand and grass in Bear Creek.—"*P. neglectum* St., or near (immature)." Sterki.

64. *Pisidium subrotundum pumilum* Sterki.—Schoolcraft: From the bed of a brook.

65. *Pisidium* sp.—Chippewa: Black ash swamp at Vermilion. Not sent to Dr. Sterki.

SUMMARY OF THE DISTRIBUTION OF THE SPECIES LISTED, INCLUDING ISLE ROYALE RECORDS.

S. = Schoolcraft County, A. = Alger Co., C. = Chippewa Co., I. R. = Isle Royale.

	S.	A.	C.	I. R.
1. <i>Polygyra albolabris</i> (Say).....	*	*	*	*
2. <i>Polygyra fraterna</i> (Say).....	*	*	*	
3. <i>Vitrea hammonis</i> (Ström).....	*			
4. <i>Vitrea binneyana</i> (Mse.).....	*			*
5. <i>Vitrea ferrea</i> (Mse.).....	*			
6. <i>Euconulus chersinus polygyratus</i> Pils.....	*	*		*
7. <i>Zonitoides arborea</i> (Say).....	*	*	*	*
8. <i>Zonitoides exigua</i> (Stimp.).....	*			*
9. <i>Agriolimax agrestis</i> (L.).....			*	
10. <i>Agriolimax campestris</i> (Binn.).....	*			*
11. <i>Pallifera dorsalis</i> (Binn.).....	*		*	*
12. <i>Pyramidula alternata</i> (Say).....	*	*	*	*
13. <i>Pyramidula cronkhitei anthonyi</i> Pils.....			*	*
14. <i>Pyramidula cronkhitei catskillensis</i> (Pils.) *			*	*
15. <i>Helicodiscus parallelus</i> (Say).....*		*		*
16. <i>Succinea retusa</i> Lea.....		*		*
17. <i>Succinea ovalis</i> Say?.....			*	*
18. <i>Strobilops virgo</i> (Pils.).....	*			*
19. <i>Cochlicopa lubrica</i> (Müll.).....	*			*
20. <i>Lymnæa humilis modicella</i> (Say).....	*			
21. <i>Lymnæa obrussa peninsulae</i> Walker.....	*			
22. <i>Lymnæa obrussa exigua</i> Lea.....			*	
23. <i>Lymnæa clodes</i> Say.....			*	
24. <i>Lymnæa lanceata</i> Gld.....	*			
25. <i>Lymnæa emarginata</i> Say.....				
26. <i>Physa gyrina</i> Say.....	*	*	*	*
27. <i>Physa elliptica</i> Lea.....			*	
28. <i>Physa ancillaria crassa</i> Walker.....				
29. <i>Physa sayii warreniana</i> Lea?.....		*	*	
30. <i>Physa integra</i> Hald. var.....	*			
31. <i>Physa aplectoides</i> Sterki.....	*			*
32. <i>Physa</i> sp.....	*		*	*
33. <i>Aplexa hypnorum</i> (L.).....	*			*
34. <i>Planorbis trivolvis</i> Say.....	*	*		*
35. <i>Planorbis trivolvis binneyi</i> Tryon.....		*		
36. <i>Planorbis antrosus</i> (Con.).....	*			*
37. <i>Planorbis antrosus striatus</i> (Baker).....	*		*	
38. <i>Planorbis hirsutus</i> Gld.....			*	*

	S.	A.	C.	I R.
39. <i>Planorbis deflectus</i> Say.....	*		*	
40. <i>Planorbis parvus</i> Say.....			*	*
41. <i>Planorbis umbilicatellus</i> Ckll.?.....			*	
42. <i>Segmentina armigera</i> (Say)..... *				
43. <i>Segmentina armigera</i> (Say) var..... *				
44. <i>Ancylus parallelus</i> C. B. Ads..... *	*		*	
45. <i>Campeloma decisa</i> (Say)..... *			*	
46. <i>Campeloma milesii</i> Lea?.....			*	
47. <i>Annicola limosa</i> (Say)..... *	*			*
48. <i>Lampsilis luteola</i> (Lam.)..... *				*
49. <i>Anodonta marginata</i> Say..... *	*		*	*
50. <i>Anodonta grandis gigantea</i> Lea..... *				
51. <i>Anodonta grandis footiana</i> Lea.....	*		*	*
52. <i>Anodontoides ferussacianus buchanensis</i> (Lea)	*	*		
53. <i>Unio complanatus</i> "Sol." (Dill.).....	*		*	
54. <i>Sphaerium sulcatum</i> (Lam.).....			*	
55. <i>Sphaerium sulcatum planatum</i> Sterki.....			*	
56. <i>Sphaerium lineatum</i> Sterki.....			*	
57. <i>Sphaerium stamineum</i> (Con.).....			*	
58. <i>Sphaerium vermontanum</i> Prime..... *				
59. <i>Sphaerium rhomboideum</i> (Say).....			*	
60. <i>Sphaerium occidentale</i> Prime..... *			*	
61. <i>Musculium truncatum</i> (Lins.)..... *				*
62. <i>Pisidium variabile</i> Prime..... *				*
63. <i>Pisidium neglectum</i> Sterki..... *				
64. <i>Pisidium subrotundum pumilum</i> Sterki..... *				*
65. <i>Pisidium</i> sp.....			*	*
Total for each locality.....	41	18	33	28

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